MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

PMT0201 – MATHEMATICS II

(All sections / Groups)

26 MAY 2017
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **5 pages** only including the cover page with **4 Questions**.

2. Attempt **ALL FOUR** questions. The distribution of the marks for each question is given.

3. Please write your answers in the Answer Booklet provided, and **START EACH QUESTION ON A NEW PAGE**.

4. Show proper steps.

Question 1 (10 Marks)

(a) (i) The point $P\left(\frac{2}{5}, y\right)$ is on the unit circle in Quadrant IV. Find its y-coordinate.

(ii) Find cos$t$, csc$t$ and cot$t$, where t is the distance along the unit circle in counterclockwise direction starting from the point (0,1) and ending at point $P\left(\frac{2}{5}, y\right)$.

[3 marks]

(b) Given θ is an angle in Quadrant I and $\csc\theta = \frac{7}{6}$.

(i) Express $\cos\theta$ in terms of $\sin\theta$.

(ii) From the obtained expression in (i), find the exact value of $\cos\theta$.

[3 marks]

(c) Given that $y = 2\sin\left(4x - \frac{\pi}{2}\right) + 3$.

(i) Find the amplitude, period, phase shift and vertical shift of the given y.

(ii) Sketch one complete period of $y = 2\sin\left(4x - \frac{\pi}{2}\right)$.

[4 marks]

Continued...

Question 2 (15 Marks)

(a) Find the exact value of

$$\sin\left(\cos^{-1}\left(\frac{1}{5}\right)\right).$$

[2 marks]

(b) A triangle ABC has a=20, b=13 and $\angle C = 66^\circ$.

(i) Based on the given information, sketch the triangle ABC.

(ii) Solve the triangle ABC. Round your answers to **four** decimal places.

(iii) Find the area of the triangle ABC. Round your **final answer** to **two** decimal places.

[5 marks]

(c) Show that identity

$$\frac{\sin(2x)}{1-\cos(2x)} = \cot(x)$$

[2 marks]

(d) Solve the equation $2\cos(2x) - \sqrt{3} = 0$.

[2 marks]

(e) Given that complex number $z = -\sqrt{2} - \sqrt{2}\,i$.

(i) Graph z on the complex plane.

(ii) Then find the polar form of z.

(iii) Use **De Moivre's Theorem** to find z^8. Leave the answer in the form of $z^8 = a + bi$ where $a, b \in \Re$.

[4 marks]

Continued...

Question 3 (15 Marks)

(a) Compute the limits. Show at least one intermediate step.

(i) $\lim_{x\to -4} \dfrac{x^2-16}{x^2+2x-8}$

(ii) $\lim_{x\to \infty} \dfrac{3x^2+6x}{x^2-9x-2}$ **[3 marks]**

(b) Suppose

$$f(x)=\begin{cases} 2x-\sin\left(\dfrac{x\pi}{2}\right), & \text{if } x\le 2 \\ \sqrt{3x-2}, & \text{if } x>2 \end{cases}$$

Determine whether f is continuous at 2. Show proper steps. **[2 marks]**

(c) Let $g(x)=\sqrt{2x+1}$.

Find $g'(3)$ using the **formal definition** of derivative. **[3 marks]**

(d) Find the derivatives of

(i) $p(x)=3xe^{2x}$.

(ii) $q(x)=\dfrac{\sin(x)}{4\cos(x)+1}$.

Show proper steps and simplify your answers. **[3 marks]**

(e) Let $h(x)=x^3-12x, \quad 0\le x\le 3$.

(i) Find the critical point(s) and end points for the given domain.

(ii) From (i), determine the absolute maximum and minimum values of the function h.

[4 marks]

Continued...

Question 4 (10 Marks)

a) Compute the integral

$$\int_1^2 \frac{4x+10}{\sqrt{x^2+5x}}dx.$$

[3 marks]

b) Use **integration by parts** to find

$$\int \ln(5x)dx.$$

[3 marks]

c) Given the curves $y = 2x - x^2$ and $y = 3x - 6$.

i) On the same axes sketch the graphs and find the points of intersections between the curves.

ii) Find the area of region enclosed by the two curves.

[4 marks]

End of Page.